PERFUSION TECHNIQUES AND LIVER CELL TRANSPLANTATION

Breakthrough could end need for transplants

Bank for liver cells

Lifesaver: William Dods, 2, with mother Shelley. Pictures: CRAIG WOOD

Toddler's organ ordeal

IT took two teams of surgeons 15 hours to give William Dods a new liver and a second shot at life.

The Benalla two-year-old almost died during the surgery and took weeks to recover.

Twice a day for the rest of his life he must take drugs to suppress his immune system and stop his body rejecting the donated liver.

Mum Shelley said yesterday she hoped other children might one day avoid such surgery.

The new technique developed by Melbourne researchers to regrow livers without surgery sounded amazing, she said.

By FIONA HUDSON

"It sounds good because there is such a shortage of donor organs," she said.

"If no other child has to go through what William went through, that would be great."

The problem with William's original liver — it was missing a bile duct — meant he would still have needed a transplant even if the new technique was available, she said.

"But the waiting lists will be shorter when the technique is available, so it will still help kids like him down the track," she said.

MELBOURNE scientists have regrown a healthy liver inside a sick mouse without the need for transplant surgery.

Researchers will test the ground-breaking technique on Victorian children within a year.

They say it could also be used to treat common adult liver conditions including hepatitis C and cirrhosis.

The therapy involves infusing snap-frozen healthy liver cells harvested from a donor into the diseased liver.

The infused cells grow and slowly take over the sick liver to correct the disease. The liver is the only solid organ capable of regenerating itself in this way.

Construction of a special liver cell bank at the Royal Children's Hospital for a ready supply of snap-frozen cells will begin next month.

Human tests of the technique will begin once the bank opens.

It will be one of only a handful of liver cell banks in the world.

Murdoch Childrens Research Institute researcher Dr Katie Allen said the technique was exciting because there was a chronic shortage of donor livers for transplants. "This could help hundreds of Australians every year," she said.

The new method used cells harvested from liver offcuts or leftover livers unsuitable for transplant, she said.

Liver transplants were expensive and time-consuming, often taking two surgical teams up to 18 hours to perform.

"The cell transplant is a day procedure. You put a catheter into a vein in the liver and infuse the

By FIONA HUDSON, medical reporter

cells over half an hour," she said.

Tests in mice showed it could take as few as six weeks for healthy cells to rejuvenate a sick liver, Dr Allen said.

More than 50 human patients in the US had already undergone cell transfers, she said.

"It has mostly been used in people whose liver has packed up and they are going to die in a few days," she said.

The therapy had prolonged these patients' lives, but not saved them because they were too sick, she said.

Dr Allen has just completed a ground-breaking test on mice with mild, not fatal, disease.

The test was the first evidence showing the therapy had potential for patients suffering mild disease.

"This shows we can put cells in earlier, we don't have to wait until the patient is dying," she said.

Results of the experiments have been submitted for publication in an international scientific journal.

Dr Allen said research was also under way to see if the therapy could be performed using stem cells.

The new liver cell bank is funded by donations from Rotary.

Royal Children's Hospital liver expert Dr Arnold Smith said the new technique was promising.

In the short term, it would offer hope for children with rare genetic disorders of the liver, he said.

As the technique was perfected it was likely to offer hope to many other patients suffering liver failure. "I think it's very worthwhile," he said.

The Liver cell Bank

- A facility that processes human hepatocytes
- A facility which stores suspension of liver cells in liquid nitrogen
- Key to the process is perfusion of the liver with collagenase

Why do we need a Liver Cell Bank?

- Liver transplantation one of the most expensive operative procedures ~95,000
- 16% of patients die while on waiting lists
- World wide shortage of donor organs
- Australasian donor rates amongst lowest in the western world, 9.3 per million of population

Liver Cell Transplantation

Recipient PATIENT

DONOR Liver

Liver Cell Transplantation via portal vein

Single cell suspension of liver cells

So Why a Perfusionist?

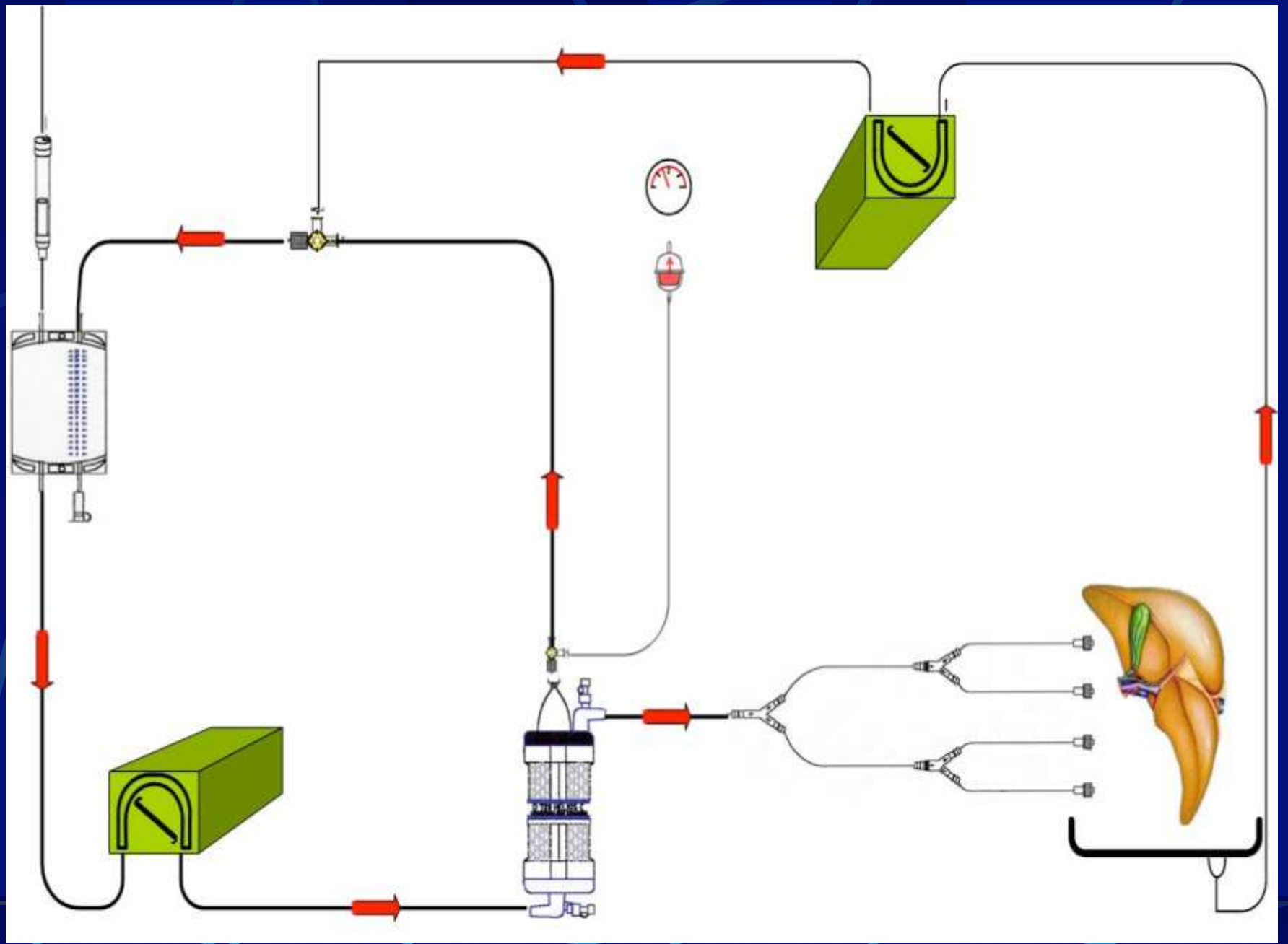
- Skilled at working with tubing, pumps and fluids (like a winemaker)
- Have appropriate contacts with tubing and component manufactures

Our Brief

- Pump flows between 50 – 300 ml/min (divided between four lines)
- Perfusion temperature between 36 - 38º
- Re-circulating circuit
- Pressure monitoring
- Air bubble trap

Circuit design

- Core of the circuit was the method of keeping the fluid at temperature
- Helios Cardioplegia Heat exchanger chosen

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Where to?

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Acknowledgments

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